Refine Search

Search Results -

Terms	Documents
L10 and L12	37

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L13

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Monday, January 19, 2004 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L13	l10 and L12	37	L13
L12	request$	420319	L12
L11	l2 and L10	0	L11
L10	l1 and l6	54	L10
L9	l3 and L8	3	L9
L8	learn$	151386	L8
L7	l3 and L6	0	L7
L6	learn$ near route	181	L6
L5	l3 and L4	0	L5
L4	learn$ adj route	132	L4
L3	l1 and L2	81	L3
L2	(traffic adj information) near request$	116	L2
L1	(mobile adj terminal) or vehicle	1688556	L1

h e b b cg b e e ch

END OF SEARCH HISTORY

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L7: Entry 12 of 25 File: USPT May 28, 2002

DOCUMENT-IDENTIFIER: US 6396395 B1
TITLE: Programmable vehicle stopping system and process for route learning

Abstract Text (1):
A programmable bus stopping system of a mobile vehicle in electrical communication with controllers or actuators for all of the safety and warning devices requiring actuation upon a vehicle stop for passenger egress. The electrical communication may be through an area wide network that may allow multiplexing. In addition the controllers or actuators, the communication network may be electrically engaged to an electronic system controller for coordinating operation of controllers and actuators. There may be a manual switch, push-button, or actuator accessible to the driver of the vehicle that allows communication to activate a series of activities that must occur upon a bus stopping to let on or let off passengers. The system activation points may be tied to vehicle speed or to vehicle position relative to a stop requiring a component or components to activate. The system may learn a route and the automatic actions of the safety and warning devices of the vehicle when a driver drives the route once manually initiating the actions and then the system programs itself to perform all the actions related to safety and warning devices.

Brief Summary Text (2):
School buses and to a lesser degree other people transportation vehicles have a number of components which need to be operated upon stops. For example upon stopping for passenger entry or exit egress, the driver of a school bus must operate flashing lights, foldable stop signs, bumper crossing arms, door openers, and parking brake of the vehicle. These requirements, most of them statutory, add demands upon the driver who is supposed to be watching out for passenger safety and operating the vehicle safely all at the same time. This invention relates to a system for a school bus or other people transportation vehicle that allows for one switch manual activation of all the stopping safety and warning lights and for automatic activation of all of these devices as sensed by vehicle position. Additionally, vehicle electronic controllers may be programmed to learn routes and all stops for which the automatic operation of the above safety and warning lights require operation. The system may be back-fit into a vehicle or programmed into controllers of a multiplexed electronic controller network. The invention also includes the steps of initiation and of learning routes, these steps recorded on tangible computer media.

Brief Summary Text (5):
Current vehicles have different forms of electronic communication networks. At a simple level, communication between two agents may be kept physically separated from communications occurring among other agents. Where two or more signals do not use the same physical space, there is no need to separate the signals in time or in carrier wave frequency. Such a communications regime is sometimes termed physical division multiplexing although the term multiplexing is usually reserved to techniques for applying multiple signals to a single medium or physical space. So-called physical division multiplexing describes how motor vehicles have been traditionally wired. The use of separate dedicated wires to connect each switch and lamp is a type of physical division multiplexing. Obviously, physical division multiplexing, while simple in concept, results in the use of many wires (the classical motor vehicle electrical harness), which are difficult to install during

manufacturing and problematic to maintain in the field.

Brief Summary Text (7):
A line communicating a signal from a remote switch to a lamp to turn on or off (by having a second switch, local to the lamp, change states to control connection of the lamp between a power bus and ground) cycles only rarely. In a typical trip such a change in state occurs only once or twice, if at all. Where such a line is not intended to provide power to the lamp, and simply indicates changes in state for the local switch controlling the lamp, the line will have the capacity to handle far more data than the occasional indications to turn a lamp on and off. The objective of maintaining simplicity in manufacturing and maintenance are preferably met by allowing communication among a number of components to occur in a single medium, or at least as few communication lines as possible. The line used to connect switch and lamp could interconnect a number of components, carrying messages between any grouping of elements connected to the line when not required to carry an instruction to a lamp to turn on. One way of achieving this objective is a communications regime that divides time into slots during which particular combinations of components have use of a signaling line. Such methods are well known in the art and are examples of time division multiplexing (TDM), In motor vehicles, time division and related multiplexing techniques offer substantial simplification in physical layer required to support the control of vehicle vocations. The invention of this application involves one of those vocations.

Brief Summary Text (9):
As applied to motor vehicles, multiplexed communications over serial data paths are an effective technique for reducing the number of dedicated communication paths between the numerous switches, sensors, devices and gauges installed on the vehicles. With each increase in the number and variety of accessories and functions installed on each vehicle, the benefits of using a single, multiplexed communication serial link for passing instructions to and receiving information from vehicle devices as diverse as running lights and rear axle temperature sensors becomes greater. Multiplexing the signals to and from local controllers and switches for vehicle systems promises greater physical simplicity through displacing much of the vehicle wiring harness, reducing manufacturing costs, facilitating vehicle electrical load management, and enhancing system reliability.

Brief Summary Text (10):
The specific manner of implementing multiplexed communications is outside the scope of the present invention, which may apply a defined protocol, the SAE J1939 protocol or a proprietary protocols over a network similar to that described here. The development by the Society of Automotive Engineers of the J1939 series of standards for multiplexed communications testifies to the progress in the application of multiplexed communications to vehicles. Standards have been or are being developed relating the communication path, transmission collision detection, diagnostic ports and data protocols, among other topics. The J1939 protocol provides an open protocol and definition of the performance requirements of the medium of the physical layer, but also allows for development of proprietary protocols. The SAE J1939 protocol is a specialized application of a controlled area network (CAN) and may be readily implemented utilizing commercial integrated circuits such as the C167 Integrated Circuit from Siemens of Germany.

Brief Summary Text (11):
A serial communications system utilizing a multiplexing regime can link several remote digital controllers or actuators or sensors positioned around a vehicle with an electrical system controller (ESC) for two-way communication. Remote digital controllers are addressable, allowing them to respond to signals intended for them initialize particular functions. As described above the transmission ECM may be a remote digital controller. They may also include programming that allows the device to react to local conditions as well as condition indicating signals provided the controller. The ESC may pass requests and instructions received for operations of

certain devices, addressed to the correct remote controller, in a fashion to condition the timing and duration of the responses to requests to better manage overall vehicle electrical load.

Brief Summary Text (12):
To date, there has not been a school bus or passenger vehicle that a driver may operate a single control to operate all of the safety and warning devices. Neither has there been such a vehicle that may be programmed to automatically operate these devices as a function of the vehicles position relative to programmed stopping points. There has not been a system where by all of the safety and warning devices are in communication with an ESC through a multiplexed vehicle communication system. Additionally, there has not been a system or software for a system for a school bus or passenger vehicle that may learn a route by a driver driving the route once and then programming itself to perform all the actions related to safety and warning devices.

Brief Summary Text (14):
As a result, a primary object of this invention is to provide a school bus or passenger vehicle that a driver may operate a single control to operate all of the safety and warning devices. A second object of the invention is to provide a vehicle that may be programmed to automatically operate these devices as a function of the vehicle's position relative to programmed stopping points. A third object of the invention is to provide all of the safety and warning devices of a bus be in communication with an ESC through a multiplexed vehicle communication system. A fourth object of the invention is to provide a system or software for a system for a school bus or passenger vehicle that may `learn` a route including the automatic actions for the safety and warning devices.

Brief Summary Text (15):
The programmable bus stopping system of this invention satisfies all of the above objectives. The bus stopping system is comprised of a vehicle in electrical communication with controllers or actuators for all of the safety and warning devices requiring actuation upon a vehicle stop for passenger egress. The electrical communication may be through an area wide network that may allow multiplexing. In addition the controllers or actuators, the communication network may be electrically engaged to an electronic system controller for coordinating operation of controllers and actuators. There may be a manual switch, push-button, or actuator accessible to the driver of the vehicle that allows communication to activate a series of activities that must occur upon a bus stopping to let on or let off passengers. Some of these activities include: actuating sequential sets of flashing lights or flashers to indicate the vehicle is slowing and then stopped, deploying a retractable stop sign on the side of the vehicle, opening a crossing arm mounted to a bumper to prevent passengers from crossing too close to a portion of the vehicle, applying a vehicle parking brake and then opening the door. When the vehicle restarts, the actions are reversed. The system activation points may be tied to vehicle speed or to vehicle position relative to a stop requiring a component or components to activate.

Brief Summary Text (16):
The system may learn a route and the automatic actions of the safety and warning devices of the vehicle when a driver drives the route once manually initiating the actions and then the system programs itself to perform all the actions related to safety and warning devices.

Drawing Description Text (3):
FIG. 1 is a perspective view of a vehicle with a programmable stopping system made in accordance with this invention.

Detailed Description Text (2):
A vehicle 101 with a programmable stopping system 109 made in accordance with this

invention is shown in FIG. 1. The vehicle contains a chassis 117 and a body 118. When the vehicle 101 is a school bus, the chassis 117 in combination with the body 118 of the vehicle 101 may contain a passenger door 102 controlled by a door operator 102A, a parking brake 103 applied or engaged by a parking brake actuator 103A, a crossing arm 104 controlled by a crossing arm operator 104A, a retractable stop sign 105 operated by a stop sign operator 105A, yellow flashing lights 106 and red flashing lights 107. The vehicle 101 may contain a sensed parameter measurement device 190 such as a speed sensing device 121 or a navigation system 131, for providing the geographic location of the vehicle 101. The navigation system may be a Global Positioning System (GPS) that takes an external input from a satellite like the commercially available LORAN system. The navigation system 131 may alternatively be a dead reckoning system without an external input or a combination of an external system and an internal to the vehicle 101 dead reckoning system.

Detailed Description Text (3):
The invention in is its most basic form includes safety and warning devices 150 required to be initiated upon stopping a passenger carrying vehicle 101, a manual operator 113, a sensed parameter measurement device 190, and a common data bus 110 engaged to the manual operator 113, the sensed parameter device 190, and the safety and warning devices 150. The manual operator 113 communicates with the safety and warning devices 150 to activate the devices 150 over the common data bus 110. Such communication is by a standard communication protocol that may be the SAE J1939 protocol. This basic embodiment is shown in FIG. 2. The programmable stopping system 109 may additionally comprise an electrical system controller (ESC) 111, which may be the primary component of a vehicle electronic control system or alternatively may be a different electronic processor. ESC 111 may manage a number of vocational controllers disposed on vehicle 101 and executes a load management program which oversees the total load imposed on the vehicle electrical system and power train by various accessories installed on the vehicle. Most active vehicle components such as the safety and warning devices 150 are directly controlled by one of a group of dependent controllers, operators, or actuators which include the door operator 102A, the parking brake actuator 103A, the crossing arm operator 104A, the stop sign operator 105A, and controllers for the yellow flashing lights 106 and the red flashing lights 107, all of which are connected to ESC 111 over the common data bus 110. See FIG. 3. The applicable controllers, operators, or actuators are considered a sub-component of the component they operate under this specification. The ESC 111 may be programmed to direct operation of the controllers, operators, and actuators of the safety and warning devices.

Detailed Description Text (4):
The common data bus 110 may be a serial data bus or link 110. The autonomous controllers or operators may include local data processing and programming and are typically supplied by the manufacturer of the controlled component. The serial data link 110 may be a twisted pair cable constructed in accordance with SAE standard J1939 and may be externally accessible via a diagnostic port 136. Although the autonomous controllers handle many functions locally and are functionally difficult without reference to ESC 111, they report data to ESC 111 and can receive operational requests from ESC 111. An example of data reports to the ESC 111, might be the position of the crossing arm 104 from the crossing arm operator 104A. An example of an operational request from the ESC 111 to the crossing arm operator 104A might be direction to open or deploy a front mounted crossing arm 104 to prevent a passenger from crossing too close to the front of the vehicle 101. The alternative common data bus 110 may operate using proprietary communication protocol other than an industry standard.

Detailed Description Text (5):
The ESC 111 may be programmed to operate all, one, or some of the safety and warning devices 150 upon an initiation condition or sequence of initiation conditions as shown in FIG. 7. One programmed stop sequence is commenced by use of the manual operator 113 located in a convenient location for the driver. The manual

operator 113 contains a button or switch or lever 113A that the driver may operate to initiate the speed initiated sequence. A semi-automatic sequence of initiating events is commenced by the driver actuating the button 113A prior to commencing slowdown to stop. The ESC 111 receives the semi-automatic sequence message over the data link 110 and then provides sequential signals to sets of the applicable safety and warning devices 150, also over the data link 110, to actuate based upon a sensed dynamic parameter from the sensed parameter measurement device 190 and a pre-programmed sequence of steps. The embodiment shown in FIG. 8 demonstrates that there may be as few as one set of safety and warning devices 150 to be actuated and that the vehicle door operator 102A does not necessarily have to be one of the safety and warning devices 150. The sensed dynamic parameter may be vehicle 101 speed alone from speed sensing device 121, vehicle 101 position as sensed by the navigation system 131 alone, or a combination of speed and location.

Detailed Description Text (6):
One embodiment of the semi-automatic sequence with speed alone as the sensed parameter is shown in FIG. 4. The actual speed activation levels may be varied. The driver will have selected a `stopping mode`. Subsequently, once the driver actuates the button or switch 113A, the ESC 111 directs the controller for the yellow flashing lights 106 to turn these lights on in a flash mode. As the ESC 111 receives a signal from the speed sensing device 121 that the vehicle has slowed to under a first speed limit, for example 5 miles per hour, the ESC 111 directs the controller for the yellow flashing lights to turn off the yellow flashers. Coincidentally, the ESC 111 directs the controller for the red flashing lights to turn these lights on in a flash mode. The ESC 111 then directs the stop sign operator 105A to deploy the stop sign 105. As the ESC receives a signal from the speed sensing device 121 that the vehicle has slowed to under a second speed limit, for example 2 miles per hour, the ESC 111 directs the crossing arm operator 104A to deploy the crossing arm 104. When the driver shifts the transmission 140 of the vehicle 101 into a `PARK` position, a transmission controller 140A relays this change to the ESC 111. The ESC 111 then directs the parking brake actuator 103A to engage the parking brake 103. Where there is a door opener other than manual, the ESC 111 also directs the door operator 102A to open the door 102. The alternatives to manual may include electrical, motor driven, air, hydraulically operated doors. When the parking brake 103 is released, the ESC 111 will direct the door operator 102A to close the door 102 if the door is operated other than manual. In one embodiment, there may be an interlock between the service brake of the vehicle operated by the drivers foot pedal and the parking brake actuator 103A. This interlock provides a foot pedal sensor 160 indicating whether the brake foot pedal is depressed. If the brake foot pedal is depressed, the ESC 111 will direct the parking brake actuator 103A to release the parking brake 103 when the driver shifts the transmission out of `PARK` to `RUN` or `OPERATE`. The ESC 111 then directs the crossing arm operator 104A to retract the crossing arm 104. As the ESC receives a signal from the speed sensing device 121 that the vehicle has increased speed to over the first limit, for example 5 miles per hour, the ESC 111 then directs the stop sign operator 105A to retract the stop sign 105. The ESC 111 directs the controller for the red flashing lights to turn these lights off. The first speed limit and the second speed limit may be varied in the programming depending on state law or customer preference.

Detailed Description Text (7):
In an alternative embodiment, the sensed dynamic parameter may be vehicle 101 position as sensed by the navigation system 131. See FIGS. 5 and 9, with FIG. 9 demonstrating that the embodiment shown in FIG. 8 may alternatively have a stop sequence initiated by the navigation system 131. In the embodiment, the navigation system 131 will provide vehicle geographic location to the ESC 111 through the data link 110. The vehicle stops will be programmed into the ESC 111. Rather than the driver having to actuate the button or switch 113A of the manual operator 113 to indicate a stop is being approached, the ESC 111 will initiate a stop sequence based upon the sensed approach to a designated stop. Then as the vehicle 101 slows,

a stopping sequence with associated ESC 111 initiation of the applicable safety and warning devices 150 will occur upon either speed reaching the first speed limit and the second speed limit. A similar restart sequence will commence when the vehicle completes with the entry and/or egress of passengers. In a variation of this embodiment shown in FIG. 6, the first speed limit and the second speed limit will be replaced by a first distance from stop and a second distance from stop. The navigation system 131 will provide the ESC 111 with vehicle location updates. When the vehicle is a set distance, a first distance from stop, the ESC 111 will direct preprogrammed actions of the devices 150 similar to those at the first speed limit. When the vehicle is a closer preset distance to the stop, a second distance from stop, the ESC 111 will direct preprogrammed actions of the devices 150 similar to those at the second speed limit. These actions will reverse when the vehicle restarts upon completing with the entry and/or egress of passengers.

Detailed Description Text (8):
The ESC 111 may be programmed to learn a route and the automatic actions of the safety and warning devices 150 of the vehicle 101 when a driver drives the route once. The resulting sequence can vary from that shown in FIGS. 4 and 5. The ESC 111 may record the manually initiated actions and then the ESC 111 programs itself to perform all the actions related to safety and warning devices 150. The ESC 111 in this `LEARN MODE` will record either the location of the vehicle when the driver initiates the actions and/or the speed at which they are initiated in the learning mode run of the vehicle 110. The ESC 111 then will record this route for future performance. In future trips the ESC 111 will initiate these preprogrammed actions upon reaching the set locations or speeds while approaching these locations. The `learn mode` requires the ESC 111 to record the stop locations. The `learn mode` allows the driver or owner of the vehicle to teach the ESC 111 new route and action sequences. One example of a variance may be a route where the crossing arm 104 needs to be deployed at some stops but at other stops traffic or road conditions preclude deploying the crossing arm 104. The algorithm for the learn mode may be embedded on any tangible media such as a computer disc, compact disc, hard drive, or external drive. The tangible media including the algorithm of the `learn mode` may be run locally on the ESC 111 or remotely by a different processor or an external controller. External controllers would be in contact with the data link 110 through cellular or digital phone, the Internet, microwave, or radio wave device.

Detailed Description Text (9):
The algorithm of the `learn mode` would in a fundamental form include the step of monitoring vehicle location or position through the navigation system 131. The next step would be the recording of the driver's manual actuation of the safety and warning devices 150 individually or actuation in the aggregate along with the specific location during a `learning run` of the specific route. The next step would be creating a program for the route to direct actuation or operation of the specific safety and warning devices 150 upon the vehicle 101 in a `pickup` mode and reaching those actuation locations for a future. An additional step in may include recording the speed at which the vehicle was traveling from the speed sensing device 121 when the driver manually actuated the safety and warning devices 150. The program creation step could include programming in the sensed speed, plus or minus some reasonable variation at actuation of the safety and warning devices 150 into the `pickup mode` program. In this way the vehicle 101 in a future run of the route would require both the vehicle 101 to be in the location for actuation and to be a safe speed for the actuation. Another simpler variation of the `learn mode` program would include sensing the location that the vehicle was in when the driver actuates the manual operator 113 and recording the location or the location, and speed of when this occurred. In this simpler `learn mode` there would be a step of creating a program for inserting location, or location and speed of the actuation of the manual operator 113. This programmed step would be for an on vehicle processor to mimic the manual operator 113 initiation upon the vehicle 101 reaching the location, or location and speed of the initiation on a future run of the

vehicle. In that case, the speed at actuation would at programmed speed levels such as the first and second speed limits described above.

Detailed Description Text (10):
The ESC 111 may be any programmable controller that can be networked with the applicable safety and warning devices 150 and programmed with the algorithm described above for directing the sequence of stopping actions and the algorithm for learning the stopping action sequence for future trips. Examples of other programmable controllers that may be the ESC 111 include an electronic control module (ECM) for an engine of the vehicle 101, an ECM for a transmission, or an ECM for a anti-lock brake system.

Detailed Description Text (11):
As described above, the programmable stopping system 109, and the vehicle 101 with the programmable stopping system 109 installed, of the present invention, some of which have been described above and others of which are inherent in the invention. Also modifications may be proposed to the programmable stopping system 109, and the vehicle 101 with the programmable stopping system 109 installed withoutdeparting from the teachings herein.

CLAIMS:

1. A vehicle with a programmable stopping system, comprising:

a chassis and body;

a data bus engaged to said chassis and body;

safety and warning devices engaged to said chassis and body for operation upon the vehicle commencing to stop and stopping;

said safety and warning devices engaged to said data bus;

a sensed parameter device engaged to said data bus;

a manual operator engaged to said data bus to electrically communicate with said safety and warning devices to activate a stop sequence of operation of said devices over said data bus;

an electrical system controller electrically engaged to said data bus; and

said electrical system controller programming comprising the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode;

monitoring if said manual operator has been actuated, and if said vehicle is in operation, entry and egress mode is selected, and said manual operator has been actuated, directing the steps of:

monitoring a sensed dynamic parameter of said sensed parameter measurement device for the sensed dynamic parameter reaching a first limit, and directing deployment and operation of a first set of said safety and warning devices when the first limit is attained; and

monitoring the sensed dynamic parameter of said sensed parameter measurement device for the sensed dynamic parameter reaching a third limit following a vehicle stop and passenger egress, and directing retraction and cessation of operation said safety and warning devices when said third limit is attained following said vehicle

commencing movement.

2. A vehicle with a programmable stopping system, comprising:

a chassis and body;

a data bus engaged to said chassis and body;

safety and warning devices engaged to said chassis and body for operation upon the vehicle commencing to stop and stopping;

said safety and warning devices engaged to said data bus;

a sensed parameter device engaged to said data bus;

a manual operator engaged to said data bus to electrically communicate with said safety and warning devices to activate a stop sequence of operation of said devices over said data bus;

an electrical system controller electrically engaged to said data bus; and

said electrical system controller programming comprising the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode;

monitoring if said manual operator has been actuated, and if said vehicle is in operation, entry and egress mode is selected, and said manual operator has been actuated, the steps of:

monitoring a sensed dynamic parameter of said sensed parameter measurement device for the sensed dynamic parameter reaching a first limit, and directing deployment and operation of a first set of said safety and warning devices when the first limit is attained;

monitoring the sensed dynamic parameter of said sensed parameter measurement device for the sensed dynamic parameter reaching a second limit and directing deployment and operation of a second set of said safety and warning devices when the second limit is attained;

directing the opening of a door for passenger egress;

directing the closing of a door for passenger egress upon the vehicle commencing movement; and

monitoring the sensed dynamic parameter of said sensed parameter measurement device for the sensed dynamic parameter reaching a third limit, and directing retraction and cessation of operation said safety and warning devices when said third limit is attained following said vehicle commencing movement.

3. A vehicle with a programmable stopping system, comprising:

a chassis and body;

a data bus engaged to said chassis and body;

safety and warning devices engaged to said chassis and body for operation upon the vehicle commencing to stop and stopping;

said safety and warning devices engaged to said data bus;

a sensed parameter device engaged to said data bus;

a manual operator engaged to said data bus to electrically communicate with said safety and warning devices to activate a stop sequence of operation of said devices over said data bus;

wherein said safety and warning devices include:

a vehicle door operator for operating a vehicle door;

a stop sign operator for deploying and retracting a stop sign;

a controller for operating yellow flashing lights;

a controller for operating red flashing lights;

said vehicle door operator, said stop sign operator, said controllers for operating yellow and red lights flashing lights all electrically engaged to said data bus;

a crossing arm operator for deploying and retracting a crossing guard; and

said crossing arm operator electrically engaged to said data bus;

an electrical system controller electrically engaged to said data bus;

said sensed parameter measurement device is a speed sensing device; and

said electrical system controller programming comprising the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring if said manual operator has been actuated, and if said vehicle is in operation, entry and egress mode is selected, and if said manual operator has been actuated directing said controller for operating yellow flashing lights to turn On said yellow flashing lights and directing performance of the steps of;

monitoring vehicle speed from said speed sensing device for vehicle speed slowing under a first speed limit, and directing said controller for operating yellow flashing lights to turn off said yellow flashing lights and directing said controller for operating red flashing lights to turn On said red flashing lights when the first speed limit is attained;

directing said stop sign operator to deploy said stop sign;

monitoring vehicle speed from said speed sensing device for vehicle speed slowing under a second speed limit, and directing said crossing arm operator to deploy said crossing guard when the second speed limit is attained;

directing said vehicle door operator to open a door for passenger egress;

directing said vehicle door operator to close said door for passenger egress upon the vehicle commencing movement;

directing said crossing arm operator to retract said crossing guard; and

monitoring vehicle speed from said speed sensing device for vehicle speed

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increasing to the first speed limit, and directing said stop sign operator to retract said stop sign and said controller for operating red flashing lights to turn off.

4. A vehicle with a programmable stopping system, comprising:

a chassis and body;

a data bus engaged to said chassis and body;

safety and warning devices engaged to said chassis and body for operation upon the vehicle commencing to stop and stopping;

said safety and warning devices engaged to said data bus;

a sensed parameter device engaged to said data bus;

a manual operator engaged to said data bus to electrically communicate with said safety and warning devices to activate a stop sequence of operation of said devices over said data bus;

wherein said safety and warning devices include:

a vehicle door operator for operating a vehicle door;

a stop sign operator for deploying and retracting a stop sign;

a controller for operating yellow flashing lights;

a controller for operating red flashing lights;

said vehicle door operator, said stop sign operator, said controllers for operating yellow and red lights flashing lights all electrically engaged to said data bus;

a crossing arm operator for deploying and retracting a crossing guard;

said crossing arm operator electrically engaged to said data bus;

a parking brake actuator for engaging and disengaging a parking brake of the vehicle; and

said parking brake actuator electrically engaged to said data bus;

an electrical system controller electrically engaged to said data bus;

said sensed parameter measurement device is a speed sensing device; and

said electrical system controller programming comprising the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring if said manual operator has been actuated, and if said vehicle is in operation, entry and egress mode is selected, and if said manual operator has been actuated directing said controller for operating yellow flashing lights to turn On said yellow flashing lights and directing performance of the steps of;

monitoring vehicle speed from said speed sensing device for vehicle speed slowing under a first speed limit, and directing said controller for operating yellow

flashing lights to turn off said yellow flashing lights and directing said controller for operating red flashing lights to turn On said red flashing lights when the first speed limit is attained;

directing said stop sign operator to deploy said stop sign;

monitoring vehicle speed from said speed sensing device for vehicle speed slowing under a second speed limit, and directing said crossing arm operator to deploy said crossing guard when the second speed limit is attained;

directing said parking brake actuator to engage said parking brake;

directing said vehicle door operator to open a door for passenger egress;

directing said vehicle door operator to close said door for passenger egress upon both a service brake pedal depressed and a transmission being shifted out of a PARK position;

directing said parking brake actuator to release said parking brake directing said crossing arm operator to retract said crossing guard; and

monitoring vehicle speed from said speed sensing device for vehicle speed increasing to the first speed limit, and directing said stop sign operator to retract said stop sign and said controller for operating red flashing lights to turn off when the first speed limit is attained.

5. The vehicle of claim 4, wherein:

said electrical system controller programmed to execute a load management program that oversees a total load imposed on a vehicle electrical system and power train by various accessories installed on said body and chassis.

6. The vehicle of claim 5, wherein:

the first speed limit is a greater speed than the second speed limit.

7. The vehicle of claim 6, wherein:

the first speed limit is 5 miles per hour; and

the second speed limit is 2 miles per hour.

8. A vehicle with a programmable stopping system, comprising:

a chassis and body;

a data bus engaged to said chassis and body;

safety and warning devices engaged to said chassis and body for operation upon the vehicle commencing to stop and stopping;

said safety and warning devices engaged to said data bus;

a sensed parameter device engaged to said data bus;

a manual operator engaged to said data bus to electrically communicate with said safety and warning devices to activate a stop sequence of operation of said devices over said data bus;

wherein said safety and warning devices include:

a vehicle door operator for operating a vehicle door;

a stop sign operator for deploying and retracting a stop sign;

a controller for operating yellow flashing lights;

a controller for operating red flashing lights;

said vehicle door operator, said stop sign operator, said controllers for operating yellow and red lights flashing lights all electrically engaged to said data bus;

a crossing arm operator for deploying and retacting a crossing guard;

said crossing arm operator electrically engaged to said data bus;

a parking brake actuator for engaging and disengaging a parking brake of the vehicle; and

said parking brake actuator electrically engaged to said data bus;

an electrical system controller electrically engaged to said data bus;

said sensed parameter measurement device is a navigation system; and

said electrical system controller programming comprising the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring for when said navigation system provides a signal that a planned vehicle stop is being approached, and if said vehicle is in operation, entry and egress mode is selected, and if a planned vehicle stop is approached, directing said controller for operating yellow flashing lights to turn On said yellow flashing lights and directing performance of the steps of:

monitoring vehicle speed from said speed sensing device for vehicle speed slowing under a first speed limit, and directing said controller for operating yellow flashing lights to turn off said yellow flashing lights and directing said controler for operating red flashing lights to turn On said red flashing lights when the first speed limit is attained;

directing said stop sign operator to deploy said stop sign:

monitoring vehicle speed from said speed sensing device for vehicle speed slowing under a second speed limit, and directing said crossing arm operator to deploy said crossing guard when the second speed limit is attained;

directing said parking brake actuator to engage said parking brake;

directing said vehicle door operator to open a door for passenger egress;

directing said vehicle door operator to close said door for passenger egress upon both a service brake pedal depressed and a transmission being shifted out of a PARK position;

directing said parking brake actuator to release said parking brake directing said crossing arm operator to retract said crossing guard; and

monitoring vehicle speed from said speed sensing device for vehicle speed increasing to the first speed limit, and directing said stop sign operator to retract said stop sign and said controller for operating red flashing lights to turn off when the first speed limit is attained.

9. The vehicle of claim 8, wherein:

said electrical system controller programmed to execute a load management program that oversees a total load imposed on a vehicle electrical system and power train by various accessories installed on said body and chassis.

10. The vehicle of claim 9, wherein:

the first speed limit is a greater speed than the second speed limit.

11. The vehicle of claim 10, wherein:

the first speed limit is 5 miles per hour; and

the second speed limit is 2 miles per hour.

12. A vehicle with a programmable stopping system, comprising:

a chassis and body;

a data bus engaged to said chassis and body;

safety and warning devices engaged to said chassis and body for operation upon the vehicle commencing to stop and stopping;

said safety and warning devices engaged to said data bus;

a sensed parameter device engaged to said data bus;

a manual operator engaged to said data bus to electrically communicate with said safety and warning devices to activate a stop sequence of operation of said devices over said data bus;

wherein said safety and warning devices include:

a vehicle door operator for operating a vehicle door;

a stop sign operator for deploying and retracting a stop sign;

a controller for operating yellow flashing lights;

a controller for operating red flashing lights;

said vehicle door operator, said stop sign operator, said controllers for operating yellow and red lights flashing lights all electrically engaged to said data bus;

a crossing arm operator for deploying and retracting a crossing guard;

said crossing arm operator electrically engaged to said data bus;

a parking brake actuator for engaging and disengaging a parking brake of the vehicle; and

said parking brake actuator electrically engaged to said data bus;

an electrical system controller electrically engaged to said data bus;

said sensed parameter measurement device is a navigation system; and

said electrical system controller programming comprising the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring for when said navigation system provides a signal that a planned vehicle stop is being approached, and if said vehicle is in operation, entry and egress mode is selected, and if a planned vehicle stop is approached, directing said controller for operating yellow flashing lights to turn On said yellow flashing lights and directing performance of the steps of:

monitoring vehicle location from said navigation system for a first distance from vehicle stop, and directing said controller for operating yellow flashing lights to turn off said yellow flashing lights and directing said controller for operating red flashing lights to turn On said red flashing lights when the first distance from vehicle stop is attained;

directing said stop sign operator to deploy said stop sign;

monitoring vehicle location from said navigation system for a second distance from vehicle stop, and directing said crossing arm operator to deploy said crossing guard when the second distance from vehicle is attained;

directing said parking brake actuator to engage said parking brake;

directing said vehicle door operator to open a door for passenger egress;

directing said vehicle door operator to close said door for passenger egress upon both a service brake pedal depressed and a transmission being shifted out of a PARK position;

directing said parking brake actuator to release said parking brake directing said crossing arm operator to retract said crossing guard; and

monitoring vehicle location from said navigation system for a first distance from vehicle stop, and directing said stop sign operator to retract said stop sign and said controller for operating red flashing lights to turn off when said first distance from stop is attained.

13. The vehicle of claim 12, wherein:

said electrical system controller programmed to execute a load management program that oversees a total load imposed on a vehicle electrical system and power train by various accessories installed on said body and chassis.

14. The vehicle of claim 13, wherein:

the first distance from vehicle stop is a farther distance from the vehicle stop than the second distance from stop.

15. A vehicle stopping system for engagement to a mobile vehicle for directing the operation of safety and warning devices of the vehicle, the vehicle having an a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a sensed parameter device engaged to the data bus,

a manual operator engaged to the data bus to electrically communicate with the safety and warning devices to activate a stop sequence of operation of the safety and warning devices over the data bus, and an electrical system controller electrically engaged to the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if the vehicle is in operation and moving;

computer readable program means for causing the monitoring if driver has selected entry and egress mode;

computer readable program means for causing the monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and the manual operator has been actuated, directing the steps of:

monitoring a sensed dynamic parameter of the sensed parameter device for the sensed dynamic parameter reaching a first limit, and directing deployment and operation of a first set of the safety and warning devices when the first limit is attained; and

monitoring the sensed dynamic parameter of the sensed parameter measurement device for the sensed dynamic parameter reaching a third limit following a vehicle stop and passenger egress, and directing retraction and cessation of operation the safety and warning devices when the third limit is attained following the vehicle commencing movement.

16. A vehicle stopping system for engagement to a mobile vehicle for directing the operation of safety and warning devices of the vehicle, the vehicle having an a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a sensed parameter device engaged to the data bus, a manual operator engaged to the data bus to electrically communicate with the safety and warning devices to activate a stop sequence of operation of the safety and warning devices over the data bus, and an electrical system controller electrically engaged to the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if the vehicle is in operation and moving;

computer readable program means for causing the monitoring if driver has selected entry and egress mode;

computer readable program means for causing the monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and the manual operator has been actuated, directing the steps of:

monitoring a sensed dynamic parameter of the sensed parameter measurement device for the sensed dynamic parameter reaching a first limit, and directing deployment and operation of a first set of the safety and warning devices when the first limit is attained;

monitoring the sensed dynamic parameter of the sensed parameter measurement device for the sensed dynamic parameter reaching a second limit, and directing deployment and operation of a second set of the safety and warning devices when the second limit is attained;

directing the opening of a door for passenger egress;

directing the closing of a door for passenger egress upon the vehicle commencing movement; and

monitoring the sensed dynamic parameter of the sensed parameter measurement device for the sensed dynamic parameter reaching a third limit, and directing retraction and cessation of operation the safety and warning devices when the third limit is attained following the vehicle commencing movement.

17. A vehicle stopping system for engagement to a mobile vehicle for directing the operation of safety and warning devices of the vehicle, the vehicle having an a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a vehicle speed sensing device engaged to the data bus, a manual operator engaged to the data bus to electrically communicate with the safety and warning devices to activate a stop sequence of operation of the safety and warning devices over the data bus, the safety and warning devices including a vehicle door operator for operating a vehicle door, a stop sign operator for deploying and retracting a stop sign, a controller for operating yellow flashing lights, a controller for operating red flashing lights, and a crossing arm operator for deploying and retracting a crossing guard and an electrical system controller electrically engaged to the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if the vehicle is in operation and moving;

computer readable program means for causing the monitoring if driver has selected entry and egress mode;

computer readable program means for causing the monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and the manual operator has been actuated, directing the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and if the manual operator has been actuated directing the controller for operating yellow flashing lights to turn On the yellow flashing lights and directing performance of the steps of:

monitoring vehicle speed from the speed sensing device for vehicle speed slowing under a first speed limit, and directing the controller for operating yellow flashing lights to turn off the yellow flashing lights and directing the controller for operating red flashing lights to turn On the red flashing lights when the first speed limit is attained;

directing the stop sign operator to deploy the stop sign;

monitoring vehicle speed from the speed sensing device for vehicle speed slowing under a second speed limit, and directing the crossing arm operator to deploy the crossing guard when the second speed limit is attained;

directing the vehicle door operator to open a door for passenger egress;

directing the vehicle door operator to close the door for passenger egress upon the vehicle commencing movement;

directing the crossing arm operator to retract the crossing guard; and

monitoring vehicle speed from the speed sensing device for vehicle speed increasing to the first speed limit, and directing the stop sign operator to retract the stop

sign and the controller for operating red flashing lights to turn off when the first speed limit is attained.

18. A vehicle stopping system for engagement to a mobile vehicle for directing the operation of safety and warning devices of the vehicle, the vehicle having an a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a vehicle speed sensing device engaged to the data bus, a manual operator engaged to the data bus to electrically communicate with the safety and warning devices to activate a stop sequence of operation of the safety and warning devices over the data bus, the safety and warning devices including a vehicle door operator for operating a vehicle door, a stop sign operator for deploying and retracting a stop sign, a controller for operating yellow flashing lights, a controller for operating red flashing lights, a crossing arm operator for deploying and retracting a crossing guard, and a parking brake actuator for engaging and disengaging a parking brake of the vehicle, and an electrical system controller electrically engaged to the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if the vehicle is in operation and moving;

computer readable program means for causing the monitoring if driver has selected entry and egress mode;

computer readable program means for causing the monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and the manual operator has been actuated, directing the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and if the manual operator has been actuated directing the controller for operating yellow flashing lights to turn On the yellow flashing lights and directing performance of the steps of:

monitoring vehicle speed from the speed sensing device for vehicle speed slowing under a first speed limit, and directing the controller for operating yellow flashing lights to turn off the yellow flashing lights and directing the controller for operating red flashing lights to turn On the red flashing lights when the first speed limit is attained;

directing the stop sign operator to deploy the stop sign;

monitoring vehicle speed from the speed sensing device for vehicle speed slowing under a second speed limit, and directing the crossing arm operator to deploy the crossing guard when the second speed limit is attained;

directing the parking brake actuator to engage the parking brake;

directing the vehicle door operator to open a door for passenger egress;

directing the vehicle door operator to close the door for passenger egress upon both a service brake pedal depressed and a transmission being shifted out of a PARK position;

directing the parking brake actuator to release the parking brake directing the crossing arm operator to retract the crossing guard; and

monitoring vehicle speed from the speed sensing device for vehicle speed increasing to the first speed limit, and directing the stop sign operator to retract the stop sign and the controller for operating red flashing lights to turn off when the first speed limit is attained.

19. A vehicle stopping system for engagement to a mobile vehicle for directing the operation of safety and warning devices of the vehicle, the vehicle having an a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a navigation system engaged to the data bus, a manual operator engaged to the data bus to electrically communicate with the safety and warning devices to activate a stop sequence of operation of the safety and warning devices over the data bus, the safety and warning devices including a vehicle door operator for operating a vehicle door, a stop sign operator for deploying and retracting a stop sign, a controller for operating yellow flashing lights, a controller for operating red flashing lights, a crossing arm operator for deploying and retracting a crossing guard, and a parking brake actuator for engaging and disengaging a parking brake of the vehicle, and an electrical system controller electrically engaged to the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if the vehicle is in operation and moving;

computer readable program means for causing the monitoring if driver has selected entry and egress mode;

computer readable program means for causing the monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and the manual operator has been actuated, directing the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring for when the navigation system provides a signal that a planned vehicle stop is being approached, and if the vehicle is in operation, entry and egress mode is selected, and if a planned vehicle stop is approached, directing the controller for operating yellow flashing lights to turn On said yellow flashing lights and directing performance of the steps of:

monitoring vehicle speed from the speed sensing device for vehicle speed slowing under a first speed limit, and directing the controller for operating yellow flashing lights to turn off the yellow flashing lights and directing the controller for operating red flashing lights to turn On the red flashing lights when the first speed limit is attained;

directing the stop sign operator to deploy the stop sign;

monitoring vehicle speed from the speed sensing device for vehicle speed slowing under a second speed limit, and directing the crossing arm operator to deploy the crossing guard when the second speed limit is attained;

directing the parking brake actuator to engage the parking brake;

directing the vehicle door operator to open a door for passenger egress;

directing the vehicle door operator to close the door for passenger egress upon both a service brake pedal depressed and a transmission being shifted out of a PARK position;

directing the parking brake actuator to release the parking brake directing the crossing arm operator to retract the crossing guard; and

monitoring vehicle speed from the speed sensing device for vehicle speed increasing to the first speed limit, and directing the stop sign operator to retract the stop sign and the controller for operating red flashing lights to turn off when the first speed limit is attained.

20. A vehicle stopping system for engagement to a mobile vehicle for directing the operation of safety and warning devices of the vehicle, the vehicle having an a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a navigation system engaged to the data bus, a manual operator engaged to the data bus to electrically communicate with the safety and warning devices to activate a stop sequence of operation of the safety and warning devices over the data bus, the safety and warning devices including a vehicle door operator for operating a vehicle door, a stop sign operator for deploying and retracting a stop sign, a controller for operating yellow flashing lights, a controller for operating red flashing lights, a crossing arm operator for deploying and retracting a crossing guard, and a parking brake actuator for engaging and disengaging a parking brake of the vehicle, and an electrical system controller electrically engaged to the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if the vehicle is in operation and moving;

computer readable program means for causing the monitoring if driver has selected entry and egress mode;

computer readable program means for causing the monitoring if the manual operator has been actuated, and if the vehicle is in operation, entry and egress mode is selected, and the manual operator has been actuated, directing the steps of:

monitoring if the vehicle is in operation and moving;

monitoring if driver has selected entry and egress mode; and

monitoring for when the navigation system provides a signal that a planned vehicle stop is being approached, and if the vehicle is in operation, entry and egress mode is selected, and if a planned vehicle stop is approached, directing the controller for operating yellow flashing lights to turn On said yellow flashing lights and directing performance of the steps of:

monitoring vehicle location from the navigation system for a first distance from vehicle stop, and directing the controller for operating yellow flashing lights to turn off the yellow flashing lights and directing the controller for operating red flashing lights to turn On the red flashing lights when the first distance from vehicle stop is attained;

directing the stop sign operator to deploy the stop sign;

monitoring vehicle location from the navigation system for a second distance from vehicle stop, and directing the crossing arm operator to deploy the crossing guard when the second distance from vehicle is attained;

directing the parking brake actuator to engage the parking brake;

directing the vehicle door operator to open a door for passenger egress;

directing the vehicle door operator to close the door for passenger egress upon

both a service brake pedal depressed and a transmission being shifted out of a PARK position;

directing the parking brake actuator to release the parking brake directing the crossing arm operator to retract the crossing guard; and

monitoring vehicle location from the navigation system for a first distance from vehicle stop, and directing the stop sign operator to retract the stop sign and the controller for operating red flashing lights to turn off when the first distance from stop is attained.

21. A vehicle stopping system for engagement to a mobile vehicle for learning a sequence of steps when to direct the operation of safety and warning devices of the vehicle, the vehicle having a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a navigation system engaged to the data bus to electrically communicate with an electrical system controller electrically engaged to the data bus to activate a sequence of operation of the safety and warning devices over the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if driver has selected a learn mode;

computer readable program means for causing the monitoring vehicle location through the navigation system;

computer readable program means for causing the monitoring and recording of the driver's manual actuation of the safety and warning devices along with the specific location of the manual actuation of each device through the data bus to the electrical system controller; and

computer readable program means for causing the creating of a program for the electrical system controller for the route to direct actuation or operation of the specific safety and warning devices upon the vehicle re-traveling the route in a pickup mode and reaching those actuation locations.

22. The vehicle stopping system of claim 21, further comprising:

computer readable program means for causing the recording the speed at which the vehicle was traveling from a speed sensing device when the safety and warning devices were manually actuated; and

said step of creating of a program for the electrical system controller for the route to direct actuation or operation includes programming in the sensed speed at actuation of the safety and warning devices within a band around the speed sensed at actuation during the learn mode run of the route and requiring the electrical system to controller to require both the vehicle to be in the location for actuation and to be in said speed band for the actuation in the learned route before directing actuation.

23. A vehicle stopping system for engagement to a mobile vehicle for learning a sequence of steps of when to direct the operation of safety and warning devices of the vehicle during a route, the vehicle having a data bus engaged to a chassis and body, the safety and warning devices electrically engaged to the data bus and engaged to the vehicle for operation upon the vehicle commencing to stop and stopping, a manual operator engaged to the data bus to electrically communicate with the safety and warning devices to activate a stop sequence of operation of the safety and warning devices over the data bus, a vehicle speed sensing device engaged to the data bus, a navigation system engaged to the data bus to electrically communicate with an electrical system controller electrically engaged

to the data bus to activate a sequence of operation of the safety and warning devices over the data bus, comprising:

a computer useable medium having computer readable program means embodied in said medium for causing the monitoring if driver has selected a learn mode;

computer readable program means for causing the monitoring vehicle location through the navigation system;

computer readable program means for causing the monitoring if the manual operator has been actuated;

computer readable program means for causing the recording the speed at which the vehicle was traveling from a speed sensing device when the manual operator has been actuated;

computer readable program means for causing the monitoring and recording of the driver's manual actuation of the manual operator along with the specific location of the manual actuation of each device and the speed of the vehicle at manual actuation through the data bus to the electrical system controller; and

computer readable program means for causing the creating of a program for the electrical system controller for the route to direct actuation or operation of the specific safety and warning devices associated with the manual operator actuation upon the vehicle re-traveling the route in a pickup mode and reaching those actuation locations and within a speed band around the speed sensed at actuation during the learn mode run of the route.

Refine Search

Search Results -

Terms	Documents
L13 and L20	2

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L21

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Monday, January 19, 2004 Printable Copy Create Case

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L21	l13 and L20	2	L21
L20	l6 and L19	32	L20
L19	learn$ and L18	75	L19
L18	l2 and l15	5715	L18
L17	sony and l1	0	L17
L16	l1 and L15	0	L16
L15	sony.asn.	257703	L15
L14	l12 and L13	5	L14
L13	accounting	47254	L13
L12	l2 and l6 and l8	64	L12
L11	l1 and L10	0	L11
L10	kazutaka.in.	11235	L10
L9	l1 and L8	1	L9
L8	ando.in.	38084	L8

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L7	l5 and L6	25	L7
L6	request$	420319	L6
L5	l3 and L4	37	L5
L4	traffic	173384	L4
L3	l1 and L2	64	L3
L2	mobile or vehicle	2026007	L2
L1	learn$ near route	181	L1

END OF SEARCH HISTORY

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Refine Search

Search Results -

Terms	Documents
L5 and L6	25

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
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Search: L7

Refine Search

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Search History

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L6	request$	420319	L6
L5	l3 and L4	37	L5
L4	traffic	173384	L4
L3	l1 and L2	64	L3
L2	mobile or vehicle	2026007	L2
L1	learn$ near route	181	L1

END OF SEARCH HISTORY

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(19)日本国特許庁（ＪＰ）　(12)**公開特許公報（Ａ）**　(11)特許出願公開番号
特開2000－28376
（P2000－28376A）
(43)公開日　平成12年１月28日(2000.1.28)

(51)Int.Cl.'	識別記号	ＦＩ		ﾃｰﾏｺｰﾄﾞ(参考)
Ｇ０１Ｃ　21/00		Ｇ０１Ｃ　21/00	Ｂ	
			Ｇ	
Ｇ０８Ｇ　1/09		Ｇ０８Ｇ　1/09	Ｆ	
1/0969		1/0969		

審査請求　未請求　請求項の数26　ＯＬ　（全 9 頁）

(21)出願番号　特願平11－169346

(22)出願日　平成11年６月16日(1999.6.16)

(31)優先権主張番号　０９／１０４８８２

(32)優先日　平成10年６月25日(1998.6.25)

(33)優先権主張国　米国（ＵＳ）

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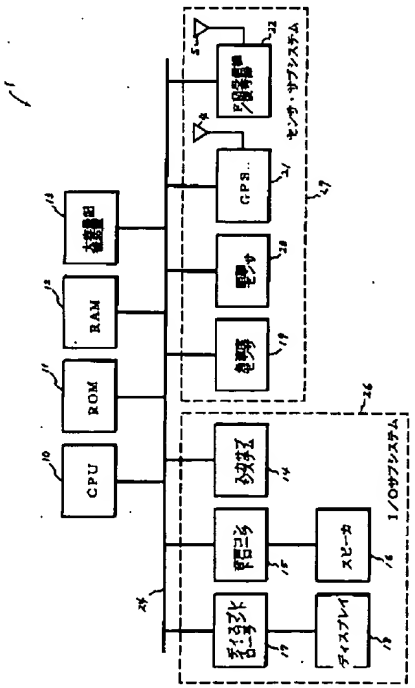
最終頁に続く

(54)【発明の名称】　リアルタイム交通情報および学習したルートに基づく交通上の助言を提供する車両ナビゲーション・システム

(57)【要約】
【課題】　リアルタイム交通情報および学習済みの通勤ルートに基づいて運転者に助言情報を通知する搭載型自動車ナビゲーション・システムを提供する。
【解決手段】　車両の移動データ履歴に基づいて通勤ルートを決定する。さらに無線リンクを介してリアルタイム交通情報を受信する。リアルタイム交通情報は交通事故、工事、その他の交通上の問題とこのような問題の位置に関する情報を含む。電源投入時にシステムは自動的に現在の日付と時刻が通勤時間枠に収まるかどうかを判定し、収まる場合、運転者に以前に通勤目的地を受け入れるか拒否するように促す。自動的にリアルタイム交通情報を受信し、あらゆる交通上の問題に関連付けられた位置情報を通勤ルートと比較する。システムが交通上の問題の位置が通勤ルート上またはその近隣であると判断した場合、システムはユーザに適当な通知を出力し、可能であれば代替ルートを計算する。



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【特許請求の範囲】

【請求項1】　車両の移動データ履歴に基づいて経験的にルートを決定するステップと、
リアルタイム交通情報を受信するステップと、
リアルタイム交通情報をルートと照合するステップと、
リアルタイム交通情報とルートの間に対応関係がある場合、運転者に通知を出力するステップとを含む車両の運転者に助言情報を提供する方法。

【請求項2】　前記車両が自動車で、前記決定ステップが車両の移動データ履歴と街路マップ・データベースに基づいて経験的にルートを決定するステップを含む請求項1に記載の方法。

【請求項3】　リアルタイム交通情報とルートの間に対応関係がある場合、代替ルートを計算するステップと、
運転者に代替ルートを通知するステップをさらに含む請求項1に記載の方法。

【請求項4】　前記決定ステップが、
自動車の移動情報のヒストグラムを作成するステップと、
ヒストグラムに基づいてルートを決定するステップを含む請求項1に記載の方法。

【請求項5】　リアルタイム交通情報が交通上の問題に関する情報をさらに含む、請求項1に記載の方法。

【請求項6】　現在時刻が以前に決められた時間枠に収まるかどうかを決定するステップと、
現在時刻が以前に決められた時間枠に収まる場合、以前に決められた目的地を受け入れるか拒否するかのプロンプトを出力するステップと、
以前に決められた目的地が受け入れられた場合に、以前に決められた目的地を現在の選択された目的地として指定するステップをさらに含む請求項1に記載の方法。

【請求項7】　自動車の運転者のナビゲーションを支援するための搭載型ナビゲーション・システムであって、
自動車の移動履歴に関する情報を獲得するステップと、
自動車の移動履歴に関する情報と街路マップ・データベースに基づいて通勤ルートを識別するステップと、
ナビゲーション・システムの電源投入に応答して、リモートの送信元から位置情報を含むリアルタイム交通情報を受信するステップと、
位置情報を通勤ルートと比較するステップと、
位置情報が通勤ルート上の位置にほぼ一致する場合、運転者に通知を出力するステップとを含む運転者に助言情報を与える方法。

【請求項8】　位置情報が通勤ルート上の位置とほぼ一致する場合、代替ルートを計算するステップと、
運転者に代替ルートを通知するステップを含む請求項7に記載の方法。

【請求項9】　前記獲得ステップが自動車が移動した位置のヒストグラムを作成するステップを含み、前記識別ステップがヒストグラムに基づいて通勤ルートを識別するステップを含む請求項7に記載の方法。

2

【請求項10】　リアルタイム交通情報が交通上の問題に関する情報をさらに含む請求項7に記載の方法。

【請求項11】　ナビゲーション・システムの電源投入に応答して、現在時刻が以前に決められた時間枠に対応するかどうかを決定するステップと、
現在時刻が以前に決められた時間枠に対応する場合、以前に記憶された目的地を再呼出しするステップをさらに含む請求項7に記載の方法。

【請求項12】　以前に決められた目的地を現在の選択された目的地として用いるステップをさらに含む請求項11に記載の方法。

【請求項13】　街路マップ・データベースを記憶する手段と、
車両の移動データ履歴および街路マップ・データベースに基づいて通勤ルートを自動的に学習する手段と、
位置情報を含むリアルタイム交通情報を受信する手段と、
ナビゲーション・システムの電源投入に応答して位置情報を通勤ルートと照合する手段と、
位置情報が通勤ルート上の位置に一致する場合、運転者に通知を出力する手段とを含む自動車運転者のナビゲーションを支援するための搭載型ナビゲーション・システム。

【請求項14】　位置情報が通勤ルート上の位置に一致している場合代替ルートを計算する手段と、
運転者に代替ルートを通知する手段をさらに含む請求項13に記載の搭載型ナビゲーション・システム。

【請求項15】　決定手段が、
自動車の移動データのヒストグラムを作成する手段と、
ヒストグラムに基づいてルートを決定する手段を含む請求項13に記載の搭載型ナビゲーション・システム。

【請求項16】　所望の目的地を指定するユーザ入力を受信する手段と、
街路マップ・データベースおよび所望の目的地に基づいて最適ルートを計算する手段と、
最適ルートに基づいて案内情報を出力する手段をさらに含む請求項13に記載の搭載型ナビゲーション・システム。

【請求項17】　現在時刻が以前に決められた通勤時間枠に収まるかどうかを決定する手段と、
現在時刻が以前に決められた通勤時間枠に収まる場合、以前に定義された通勤目的地を受け入れるか拒否するかのプロンプトを出力する手段と、
以前に定義された通勤目的地が受け入れられた場合に、以前に決められた通勤目的地を現在の選択された目的地として指定する手段をさらに含む請求項13に記載の搭載型ナビゲーション・システム。

【請求項18】　システムの動作を制御するプロセッサと、

プロセッサに結合され、ユーザ入力を受信するための入力サブシステムと、
プロセッサに結合され、案内情報を出力するための出力サブシステムと、
プロセッサに結合され、自動車の移動パラメータを測定するためのセンサ・サブシステムと、
プロセッサに結合され、街路マップ・データベースを記憶するための記憶装置と、
プロセッサに結合され、無線リンクを介してリアルタイム交通情報を受信する受信機とを含み、プロセッサが、
自動車の移動データと街路マップ・データベースに基づいて経験的に第１ルートを決定し、
リアルタイム交通情報内の位置情報を第１ルートと比較し、
位置情報が第１ルート上の位置に対応する場合、運転者に出力するための通知を生成するように構成されている、自動車の運転者のナビゲーションを支援するシステム。
【請求項１９】　プロセッサがさらに、
入力サブシステムを介して入力された目的地を受信し、
センサ・サブシステムからのデータに基づいて車両の現在位置を計算し、
入力された目的地、マップ・データベース、および車両の現在位置に基づいて第２ルートを計算し、
第２ルートに基づいて案内情報を生成するように構成されている請求項１８に記載のシステム。
【請求項２０】　プロセッサがさらに、
位置情報が第１ルート上の位置にほぼ一致する場合、第１ルートの代替ルートを計算し、
代替第１ルートの運転者に出力する通知を生成するように構成されている請求項１９に記載のシステム。
【請求項２１】　プロセッサがさらに、
自動車の移動情報のヒストグラムを生成し、
ヒストグラムに基づいて第１ルートを決定するように構成されている請求項１９に記載のシステム。
【請求項２２】　プロセッサがさらに、
現在時刻が以前に決められた時間枠に収まるかどうかを決定し、
現在時刻が以前に決められた通勤時間枠に収まる場合、
以前に決められた目的地を受け入れるか拒否するかを求めるプロンプトを出力するように構成されている請求項１８に記載のシステム。
【請求項２３】　ユーザ入力を受信するための入力サブシステムと、
案内情報を出力するための出力サブシステムと、
センサ・サブシステムと、
街路マップ・データベースを記憶するための記憶装置と、
無線リンクを介してリアルタイム交通情報を受信するための受信機と、

入力サブシステム、出力サブシステム、センサ・サブシステム、記憶装置、および受信機に結合されたプロセッサとを含み、前記プロセッサが、
センサ・サブシステムからのデータに基づいて車両の現在位置を計算し、
入力サブシステムを介して入力された目的地を受信し、
入力された目的地、マップ・データベース、および車両の現在位置に基づいて第１ルートを計算し、
第１ルートに基づいて案内情報を生成し、
自動車の移動データに基づいて経験的に第２ルートを決定し、
リアルタイム交通情報内の位置情報を第２ルートと比較し、
位置情報が第２ルート上の位置にほぼ一致する場合、運転者に出力するための通知を生成するように構成されている、自動車の運転者のナビゲーションを支援するためのシステム。
【請求項２４】　プロセッサがさらに、
位置情報が第２ルート上の位置にほぼ一致する場合、代替第２ルートを計算し、
代替第２ルートの運転者に出力する通知を生成するように構成されている請求項２３に記載のシステム。
【請求項２５】　プロセッサがさらに、
自動車の移動情報のヒストグラムを生成し、
ヒストグラムに基づいて第２ルートを決定するように構成されている請求項２３に記載のシステム。
【請求項２６】　プロセッサがさらに、
現在時刻が以前に定義された時間枠に収まるかどうかを決定し、
現在時刻が以前に定義された通勤時間枠に収まる場合、
以前に定義された通勤目的地を現在の選択された目的地として指定するように構成されている請求項２３に記載のシステム。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は自動車ナビゲーション・システムに関する。より詳細に言えば、本発明は自動車の運転者に交通助言情報を提供するための技法に関する。
【０００２】
【従来の技術】現在の自動車ナビゲーション技術は自動車の運転者が目的地に到着するのを支援する搭載型ナビゲーション・システムを含む。ある例示的搭載型ナビゲーション・システムは、運転者に目的地を入力させ、記憶された街路マップ・データベースに基づいて最適ルートを計算し、車両の移動に応じて詳細に命令を発して運転者を目的地まで案内する。この命令はテキスト、グラフィック、録音または合成音声、またはそれらの組み合わせによって生成できる。このシステムはまた記憶された街路マップに基づいて運転者に視覚的街路マップを表

示し、車両の移動に応じて車両の位置と動きを示すことができる。ナビゲーション・システムは、全地球測位システム（ＧＰＳ）などの正確な位置決定システムとも併用できるマップ突合せと組み合わせた推測航法など、車両の移動に応じて車両の位置を決定する周知の技法を使用できる。これらの機能を備えた搭載型ナビゲーション・システムはカリフォルニア州ＳｕｎｎｙｖａｌｅのＺｅｘｅｌ　Ｉｎｎｏｖａｔｉｏｎから発売されている。

【０００３】搭載型自動車ナビゲーション・システムは未知の地域でのナビゲーションに有用である。しかしながら、運転者はよく知っている地域でもナビゲーションの問題に直面することがありが、これを現在のナビゲーション・システムは扱うように設計されていない。例えば、多くの人々は通勤または通学などで毎日決まったルートで運転する。このような通勤者は通勤ルートで事故、工事などの通勤を遅らせるさまざまな交通上の問題に思いがけず遭遇することがある。交通情報は通勤時間帯にラジオおよびテレビジョン局によって一般に放送されるが、このような情報は広範囲にわたって、継続的には放送されない。その結果、重要な交通情報が通勤者に届いた時には別のルートを識別してそちらに変更するには遅すぎる場合がある。さらに、通勤者は急いでいて搭載型ナビゲーション・システムを設定して別ルートを計算したくないと考えることもある。

【０００４】

【発明が解決しようとする課題】連続的に放送されるリアルタイムの交通データをＦＭ無線信号中に載せる技術が開発されている。しかしながら、リアルタイム交通情報が利用できても、通勤者に通勤ルートに影響する交通上の問題を助言するには十分でない場合がある。例えば、交通上の問題はしばしばその問題に近接した地域からかなり離れた地域に影響する場合がある。さらに、通勤者はその通勤ルートに近いがそのルート上にない街路を知らないことがある。この結果、リアルタイム交通情報を参考にしても、通勤者は交通上の問題が自分の通勤ルートに影響することを知らない場合がある。したがって、従来技術の上記その他の不利な点を克服する搭載型自動車ナビゲーション・システムが必要とされている。

【０００５】

【課題を解決するための手段】車両の運転者に助言情報を与える新規な技法を提供する。車両の移動データ履歴に基づいてルートが経験的に決定される。次にリアルタイム交通情報が受信されこのルートと照合される。リアルタイム交通情報とルートの間に対応関係がある場合、運転者に通知がされる。本発明のその他の特徴は添付の図面と以下の説明から明らかになろう。

【０００６】

【発明の実施の形態】リアルタイム交通情報と学習した通勤ルートに基づいて交通助言情報を運転者に通知する搭載型自動車ナビゲーション・システムを記述する。以下に詳述するように、ナビゲーション・システムは自動車の運転者が使用する通勤ルートを経験的に、すなわち、自動車の獲得した移動データ履歴に基づいて学習する。より詳細に言えば、ナビゲーション・システムは一定期間にわたって自動車が移動したルートに関する情報を記憶し、この情報に基づいて通勤ルートを決定する。次にシステムは通勤ルートをリアルタイム交通情報で受信した交通助言と比較し、通勤者のルート上またはその近隣に交通事故があれば通勤者にそれを通知する。

【０００７】図１を参照すると、自動車ナビゲーション・システム１が自動車２に搭載されている。ナビゲーション・システム１は自動車２の運転者を選択した目的地に案内する上記の機能のような案内機能を実行する（「発明の属する技術分野」を参照）。ナビゲーション・システム１はＧＰＳ衛星３と交信する第１のアンテナ４、およびリモートの送信元からリアルタイム交通情報（ＲＴＩ）を受信する第２のアンテナ５を含む。

【０００８】ＲＴＩメッセージはさまざまな送信元から交通情報を受信する交通管制センタ（ＴＭＣ）６によって作成される。交通情報は例えば事故メッセージ、道路閉鎖メッセージ、道路のさまざまな区域に関する速度情報、および工事メッセージを含む。このようなデータの送信元は例えばループ・ディテクタ、自動車両識別タグ、交通分析履歴、および交通渋滞のレベルを決定する交通量に関する理論的情報である。ＴＭＣ６はまた警察、消防、または交通部門から受信する事故情報に基づいてＲＴＩメッセージを生成できる。ＴＭＣ６は受信するデータを統合してデータを標準フォーマットのＲＴＩメッセージに変換する。次にＴＭＣ６は従来の（ＰＯＴＳ）電話回線、ＩＳＤＮ回線、Ｔ１回線などのあらゆる適切なデータ通信回線を介してローカルラジオ局７へＲＴＩメッセージを送信する。

【０００９】ローカルラジオ局７はその周波数変調（ＦＭ）送信スペクトルの一部をＲＴＩメッセージの送信用に取ってある。したがって、ラジオ局７はＲＴＩメッセージをＦＭ送信スペクトルの取ってあった部分で放送する。放送されたＲＴＩメッセージは自動車２の搭載型ナビゲーション・システム１によって受信され復号化される。ＲＴＩメッセージの生成とこのようなメッセージの受信および復号化の技法は当業者には周知であることに注意されたい。ＲＴＩメッセージは交通事故の位置座標（例えば、緯度および経度）を含み、したがってナビゲーション・システム１はＲＴＩメッセージ内の位置情報を通勤ルートと比較し、ほぼ一致した場合に運転者に適切な助言を出力する。

【００１０】図２にナビゲーション・システム１の一実施形態を示す。図示のように、ナビゲーション・システム１はバス・システム２４に共に結合された中央処理装置（ＣＰＵ）１０、読み出し専用メモリ（ＲＯＭ）１１、ランダム・アクセス・メモリ（ＲＡＭ）１２、およ

び大容量記憶装置１３を含む。バス・システム２４はさまざまなブリッジ、バス・コントローラ、および／またはアダプタで相互接続できる複数のバスを表している。ＣＰＵ１０はＲＯＭ１１、ＲＡＭ１２、大容量記憶装置１３、またはこれらの装置の組み合わせに記憶された命令を実行してナビゲーション・システム１の動作を制御する。大容量記憶装置１３は街路マップ・データベースと所与の地理エリアの関心がある地点を記憶する。ＲＯＭ１１は不揮発性メモリであり、その一部は消去および再プログラミングが可能である。例えば、ＲＯＭ１１はフラッシュ・メモリ、電気的消去－プログラム可能ＲＯＭ（ＥＥＰＲＯＭ）またはその他のあらゆる適した形式のプログラム－消去可能不揮発性メモリを含むことができる。大容量記憶装置１３は大容量のデータを記憶するのに適した磁気、光、光磁気、またはその他のあらゆる不揮発性記憶装置として実施できる。

【００１１】ナビゲーション・システム１はまたセンサ・サブシステム２７を含む。センサ・サブシステムはそれぞれバス・システム２４に結合された角速度センサ（例えばジャイロスコープ）１９、距離センサ（すなわちオドメータ）２０、ＧＰＳ受信機２１、およびＦＭ受信機／復号器を含む。ＧＰＳ受信機２１の代わりにＬＯＲＡＮ－Ｃなど他のタイプの正確な位置決定システムと併用できる適切なコンポーネントを使用し、ＧＰＳ受信機を省略することもできる。センサ１９～２２はそれぞれアナログ－ディジタル変換器および適切な信号調整回路などの適切なインタフェース回路によってバス・システム２４に結合できる。ＦＭ受信機／復号器は放送されたＲＴＩメッセージを受信して復号し、ＲＴＩメッセージを表すデータをＣＰＵ１０が使用でき、記憶装置１１、１２、および１３のいずれにも記憶できるフォーマットでバス・システム２４に出力する。ナビゲーション・システム１は角速度センサ１９、距離センサ２０、およびＧＰＳ受信機２１が出力するデータを街路マップ・データベースと併用して車両の移動に応じて車両の現在位置を計算する。

【００１２】またナビゲーション・システム１は入出力（Ｉ／Ｏ）サブシステム２６を含む。Ｉ／Ｏサブシステム２６はそれぞれバス・システム２４に結合された入力サブシステム１４、音声コントローラ１５、およびディスプレイ・コントローラ１７を含む。Ｉ／Ｏサブシステム２６は、音声コントローラ１５に結合され制御される音声スピーカ１６、およびディスプレイ・コントローラ１７に結合され制御されるディスプレイ装置１８をさらに含む。入力サブシステム１４はボタンおよび／またはスイッチなどのユーザが操作可能なさまざまな制御機構を含み、運転者がそれを用いて目的地を入力し、表示モードを選択するなどナビゲーション・システム１を操作できる。ナビゲーション・システム１はディジタル化または統合された音声ナビゲーション命令を音声スピーカ１６を介してユーザに出力する。マップ表示および／またはナビゲーション命令を含む可視出力はディスプレイ装置を介してユーザに与えられる。ディスプレイ装置１８は液晶ディスプレイ（ＬＣＤ）、陰極線管（ＣＲＴ）、またはその他の形式のあらゆるディスプレイ装置である。

【００１３】本発明の各態様は以下に明らかになるようにソフトウェアで実施できることに注意されたい。すなわち、本発明の態様はＣＰＵがメモリに含まれる命令シーケンスを実行するのに応答してナビゲーション・システム１などのコンピュータ・システムで実施できる。命令はＲＡＭ、ＲＯＭ、大容量記憶装置、またはこのような装置の組み合わせから実行できる。また、本発明のさまざまな実施形態では、有線接続された回路が本発明を実施するソフトウェア命令の代わりに、またはそれと併用して使用できる。したがって、本発明はハードウェア回路およびソフトウェアのいかなる組み合わせにも、またコンピュータ・システムが実行する命令のいかなる特定の発信源にも限定されるものではない。

【００１４】一部の応用例では、複雑さとシステムのコストを抑えるために基本機能だけを搭載した搭載型ナビゲーション・システムを備えることが望ましい。したがって、ナビゲーション・システム１の一定の実施形態は上記のコンポーネントをすべて含んではいないことがある。例えば、ある応用例で詳細なナビゲーション命令を出力するナビゲーション・システムを必要としない場合、音声コントローラ１５、スピーカ１６、ディスプレイ・コントローラ１７、およびディスプレイ装置１８を警告灯および／または簡素なブザーなどのより簡素な装置で置き換えてもよい。さらに、上記のように、ＧＰＳ受信機２４を含むことも必ずしも必要でない。

【００１５】図３にナビゲーション・システム１が受信したＲＴＩメッセージを学習した通勤ルートと比較して通勤ルート上またはその近隣に交通事故があれば運転者に出力するためのルーチン全体を示す。ナビゲーション・システムの電源投入（自動車が始動されると常に自動的に発生する）に応答して、３０１でナビゲーション・システム１は現在時刻と曜日が以前に決めた通勤時間枠内にあるかどうか判定する。典型的な通勤時間を定めた通勤時間枠は、デフォルトのこともあり、またユーザがナビゲーション・システム１のスケジュール機能を介して予め入力していることもある。通勤時間枠は例えば週のユーザが指定した日の１つまたは複数の時間間隔である。現在の日付と時刻が通勤時間枠に収まる場合、３０２でシステム１はユーザに通勤の目的地を受け入れるか拒否するように促す。そうでない場合、ルーチンは終了する。通勤の目的地は学習済みの通勤ルートまたは以前にユーザが入力または選択した通勤ルートに基づいてシステム１が自動的に決定して不揮発性メモリに記憶される位置である。ユーザが３０３で通勤の目的地を受け入

れると、３０４でナビゲーション・システム１が通勤の目的地を現在選択されている目的地として用いて、リモートの送信元から送信されたＲＴＩメッセージの受信と復号化を開始する。ユーザが通勤の目的地を受け入れない場合、ルーチンは終了する。

【００１６】スケジュールされた通勤時間枠を使用すると、ユーザがその通勤の目的地および案内基準、計算基準などその他のパラメータを毎日通勤前に指定せずにすむことに注意されたい。ユーザは通勤の目的地を受け入れてボタンに触れるだけで通勤案内を起動して、以前に記憶したユーザ優先データを再呼出しすることができる。したがって、システムを操作するのに必要なユーザ入力はほとんどない。

【００１７】ＲＴＩメッセージを受信して復号化すると、３０５で交通上の問題に関するＲＴＩメッセージに組み込まれた位置情報がナビゲーション・システムによって学習済みの通勤ルートと比較される。次に、３０６でシステム１はＲＴＩメッセージ内の位置情報が通勤ルートと一致するかまたはそれに近い（ほぼ一致する）かどうかを判定する。一致または実質的な一致がない場合、ルーチンは３０４から繰り返す。しかしながら、一致または実質的な一致があった場合、３０７でシステムは運転者に運転者の通勤ルート上またはその近隣で問題があることを示す通知メッセージを出力する。このメッセージはテキスト、グラフィック、および／または音声、または上記のようにより簡素な音声または可視表示であってもよい。次に、３０８で、ナビゲーション・システム１は別の通勤ルートを利用できるかどうかを判定する。最適代替ルートを計算するためにあらゆる適した技法を用いることができる。システム１は通勤ルートの目的地および車両の現在位置をすでに認識していることに注意されたい。目的地への代替ルートを識別できない場合、ルーチンは３０４から繰り返す。代替ルートが識別された場合、システム１は３０９で代替ルートを受け入れるか拒否するよう促す。上記のルーチンにおよび以下に述べるルーチンにはさまざまな変形形態が可能であることに注意されたい。

【００１８】本発明に従って通勤ルートを計算するためにさまざまな手法を用いることができる。例えば、ナビゲーション・システム１は統計分析を自動車の移動履歴に適用できる。図４に本発明に従って通勤ルートを決定できるルーチンを示す。４０１で、ナビゲーション・システム１が以前に指定した（またはデフォルトの）通勤時間枠内で動作する場合、システム１は車両の移動に応じて複数の位置で車両の位置を計算し、タイム・スタンプをそれぞれの計算された位置を表すデータに対応させる。こうしてシステム１は車両の移動の時系列を表すデータを獲得する。時系列データはＲＡＭ１１または大容量記憶装置１３などの適切な記憶装置に記憶される。次に４０２で、記憶された位置およびタイム・スタンプ・データが記憶された街路マップ・データベースと照合される。４０２はナビゲーション・システム１の電源システム１の電源投入に応答して実行できることに注意されたい。通勤ルートは次に４０３で適切な記憶装置に記憶される。４０４で、（任意選択で）通勤ルートを用いて複数の日に獲得された位置およびタイム・スタンプ・データから生成された複合通勤ルートが更新または変更される。獲得するデータが多ければ多いほど複合通勤ルートはより正確になることに注意されたい。

【００１９】図５に通勤ルートを決定する他のルーチンを示す。図５のルーチンは車両の移動を表すデータのヒストグラムの生成に基づく。具体的には、システムはそれぞれ記憶されたマップ・データベースの１つの街路セグメントを表すいくつかのビンからなるヒストグラムをコンパイルする。別の実施形態では、ヒストグラムは緯度および経度などの街路セグメント以外の情報に基づくこともできる。したがって、５０１でシステム１は現在時刻が以前に定義された（またはデフォルトの）通勤時間枠に収まるかどうかを判定する。次に５０２で通勤時間枠内で一定周期で車両の現在の位置がナビゲーション・システム１によって計算される。それぞれの計算された車両の位置は５０３でマップ・データベースの街路セグメントに対応する。この結果、５０４で車両のそれぞれの計算された位置についてヒストグラムの適切な街路セグメント・ビンが１だけ増分される。５０５で統計的に有用な結果を生成するのに十分なデータが獲得されている場合、５０６でシステム１はヒストグラムに基づいて通勤ルートを計算する（または以前に計算された通勤ルートを更新する）。獲得されたデータの量が十分でない場合、ルーチンは５０１から繰り返す。

【００２０】以上、リアルタイム交通情報および学習済みの通勤ルートに基づいて運転者に交通助言を行う搭載型自動車ナビゲーション・システムについて説明してきた。本発明を特定の実施形態の例に関して説明してきたが、特許請求の範囲に記載する本発明のより広い精神と範囲を逸脱することなしにさまざまな変更および修正を加えることができるのは明らかである。したがって、本明細書と図面は限定的なものでなく例示的なものと見なすべきである。

【００２１】添付図面では本発明は例として示され、これに限定されるものではない。図面の同様の参照記号は同種の要素を示す。

【図面の簡単な説明】

【図１】リモートの送信元からリアルタイム交通情報を受信する搭載型自動車ナビゲーション・システムを示すブロック図である。

【図２】搭載型自動車ナビゲーション・システムのブロック図である。

【図３】リアルタイム交通情報および学習した通勤ルートに基づいて運転者に助言情報を通知するルーチン全体

を示す流れ図である。

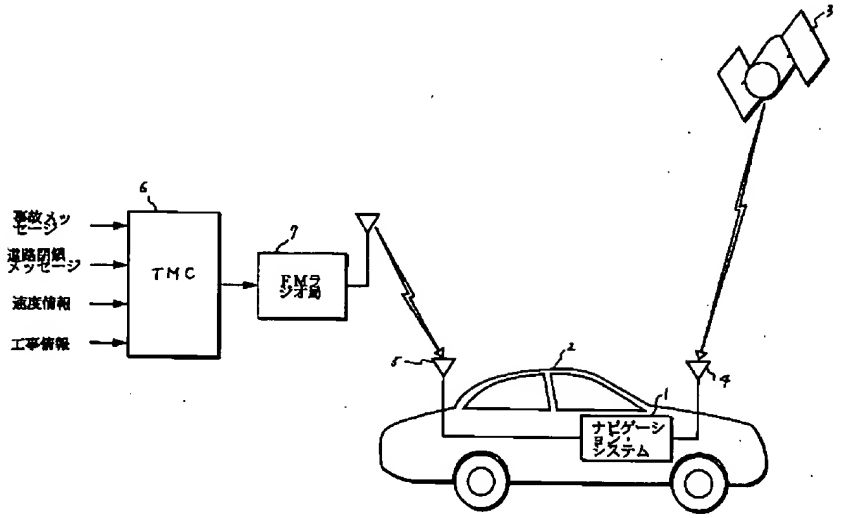
【図4】搭載型ナビゲーション・システムが通勤ルートを学習するルーチンを示す流れ図である。

【図5】搭載型ナビゲーション・システムが通勤ルートを学習するルーチンの別の実施形態を示す流れ図である。

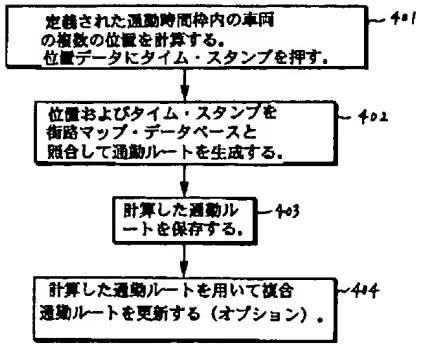
【符号の説明】

1　ナビゲーション・システム
2　自動車の
3　ＧＰＳ衛星
4　第1のアンテナ
5　第2のアンテナ
6　交通管制センタ（ＴＭＣ）
7　ローカルラジオ局
10　中央処理装置（ＣＰＵ）
11　読み出し専用メモリ（ＲＯＭ）
12　ランダム・アクセス・メモリ（ＲＡＭ）
13　大容量記憶装置
14　入力サブシステム
15　音声コントローラ
16　音声スピーカ
17　ディスプレイ・コントローラ
18　ディスプレイ装置
19　角速度センサ
20　距離センサ
21　ＧＰＳ受信機
22　ＦＭ受信機／復号器
24　バス・システム
26　入出力（Ｉ／Ｏ）サブシステム
27　センサ・サブシステム

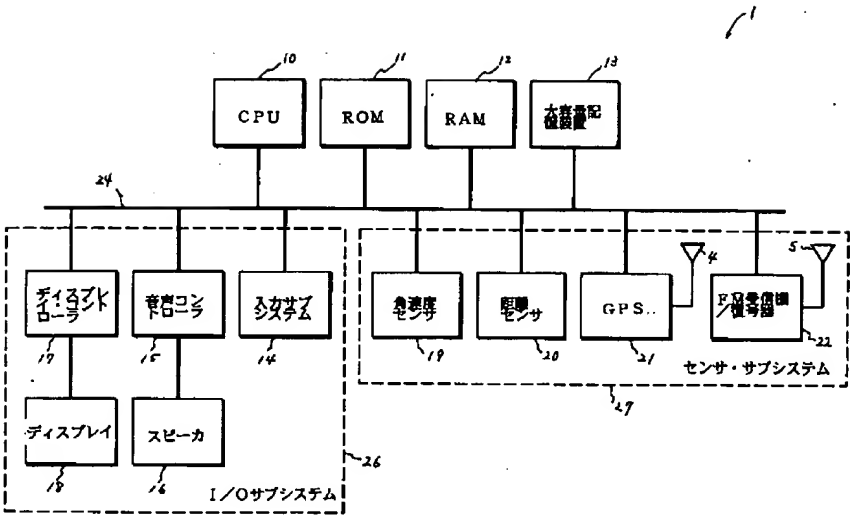
【図1】



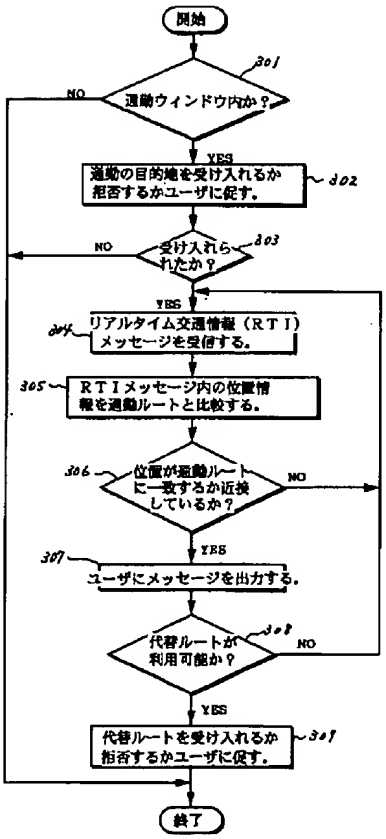
【図4】



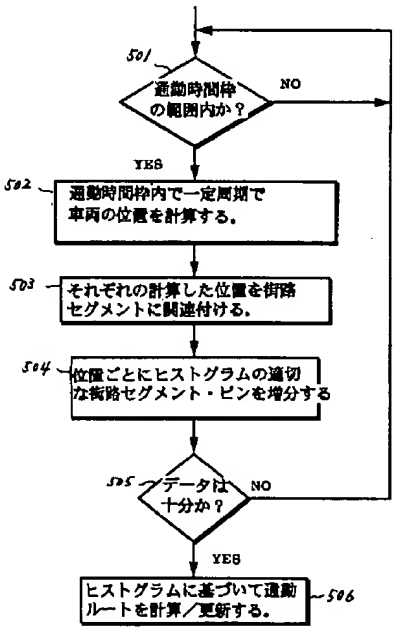
【図2】


CPU
ROM
RAM
GPS
センサ・サブシステム
I／Oサブシステム

【図3】


開始
運動ウィンドウ内か？
NO
YES
運動の目的地を受け入れるか拒否するかユーザに促す。
受け入れられたか？
リアルタイム交通情報（RTI）メッセージを受信する。
RTIメッセージ内の位置情報を運動ルートと比較する。
位置が運動ルートに一致するか近接しているか？
ユーザにメッセージを出力する。
代替ルートが利用可能か？
代替ルートを受け入れるか拒否するかユーザに促す。
終了

【図5】


運動時間枠の範囲内か？
NO
YES
運動時間枠内で一定周期で車両の位置を計算する。
それぞれの計算した位置を街路セグメントに関連付ける。
位置ごとにヒストグラムの適切な街路セグメント・ビンを増分する
データは十分か？
NO
YES
ヒストグラムに基づいて運動ルートを計算／更新する。

フロントページの続き

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